

Getting the Most from 3500 Alarm and System Event Lists

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When we designed the 3500 Series Machinery Protection System in the mid-1990s, we addressed a number of frequently requested capabilities that were not available in our previous monitoring systems. One of those was the ability for the monitoring system to act as a “flight recorder,” capturing and time-stamping alarm and other event particulars. In this article we review 3500’s *Alarm Event List* and *System Event List* capabilities, helping to ensure that new and existing users are aware of these features and derive maximum benefit from them.

The Need – Sequence of Event Determination

During a machine shutdown or process upset, single or multiple pieces of equipment may affect (or be affected by) the operations of numerous other machines or process conditions, and an avalanche of alarms can occur nearly simultaneously. In order to reconstruct “what went wrong,” it is necessary to know the types of alarms and the order in which they occurred. Sometimes, alarms occur only a few milliseconds apart, but the order in which they occur is critically important in establishing cause and effect. To address these needs, customers adopted the habit of individually wiring alarm outputs from numerous

systems (vibration monitors, overspeed systems, compressor surge controllers, etc.) into elaborate Sequence of Events (SOE) recorders. While these systems can be effective, they are both expensive and require extensive wiring. They require all plant alarm and shutdown systems to be equipped with contact closure outputs (i.e., relays), and these must all be wired into the SOE recorder. Customers desired a more distributed system whereby each alarming or protective system (such as a vibration monitoring system) would have on-board capabilities for capturing alarm events and giving them a time stamp using an internal clock synchronized to a master clock somewhere within the plant. Then, information from the various “alarm lists”

throughout a plant could be accessed using digital communications and combined with one another; namely, what type of alarm, what time it occurred, and where it occurred.



Managing the Machine – 3500 Alarm Event List

Our 3500 Series Machinery Protection System provides the capability described

above with an Alarm Event List, able to capture and retain the most recent 1000 alarms as a standard feature. The *Alarm Event List* contains the date and time of occurrence, in addition to the specific rack slot and channel number involved. Information is also retained specifying if a channel “Entered” or “Left” an alarm or NOT OK condition, as well as the time and date of a relay that was activated or deactivated. This *Alarm Event List* is retained within the 3500/20 Rack Interface Module where it can be transmitted to appropriate Bently Nevada software (such as 3500 Operator Display), supplied to a 3500/93 LCD display, or output to external process control and automation systems

using digital communications from our 3500/92 Communications Gateway module. In addition, the 3500 System's internal clock can be remotely set, allowing you to synchronize with a master clock.

Managing the Instrument – 3500 System Event List

Managing your machinery requires the ability to differentiate among and synchronize alarms from various systems, and is addressed by the 3500 *Alarm Event List* as discussed above. Managing your 3500 instrumentation is another important need and requires its own specialized list with an accurate record of instrument-related activity. The 3500's *System Event List* is designed to address these requirements. Like the *Alarm Event List*, the *System Event List* also resides in the 3500/20 Rack Interface Module. It contains information about a variety of 3500 system-related tasks such as rack configuration mode entry, monitor self-test errors, communication errors, monitor module removal, trip-multiply activation, software switch changes, configuration password changes, and numerous voltage checks throughout the rack. In addition to a description of the event, the time, date, severity class code, and rack

slot location are also included in each individual *System Event List* record. The list is continually updated so that the 400 most recent system events are retained.

Summary

Use of 3500's event lists give you "flight recorder" capabilities for managing both the 3500 rack and the machine(s) to which it is connected. These event lists are standard in every 3500 System and represent numerous options for sharing information with various people in your plant, whether machinery engineers via Bently Nevada software such as Data Manager® 2000, operators via communications with their process control systems, or instrument personnel via 3500 configuration software or dedicated display options. If you are already a 3500 user, consider how you can make use of these event lists to provide even more value to your organization. If you are considering the purchase of a machinery protection system, you'll appreciate the added flexibility and capabilities 3500 offers with standard features like our events lists. More than ever, it makes Bently Nevada's 3500 System the right choice for protecting and managing your machinery. ☺

Sequence Number	Slot	Chan	Direction	Event	Date dd/mm/yyyy	Event Time
0000004918	007	000	Enter	Not OK	06/02/2001	14:29:34.93
0000004917	007	000	Enter	Not OK	06/02/2001	14:28:50.49
0000004916	012	001	Enter	Not OK	06/02/2001	12:57:32.85
0000004915	012	002	Enter	Not OK	05/02/2001	13:34:11.82
0000004914	012	001	Enter	Danger/Alarm 2	05/02/2001	13:34:08.15
0000004913	012	001	Enter	Alert/Alarm 1	05/02/2001	13:34:08.15
0000004912	012	002	Enter	Not OK	05/02/2001	09:45:22.75
0000004911	012	002	Left	Not OK	05/02/2001	
0000004910	012	002	Enter	Not OK	05/02/2001	
0000004909	012	001	Enter	Danger/Alarm 2	05/02/2001	
0000004908	012	001	Enter	Alert/Alarm 1	05/02/2001	
0000004907	012	002	Enter	Danger/Alarm 2	05/02/2001	
0000004906	012	002	Enter	Alert/Alarm 1	05/02/2001	
0000004905	012	002	Enter	Danger/Alarm 2	02/02/2001	
0000004904	012	002	Enter	Alert/Alarm 1	02/02/2001	
0000004903	012	001	Enter	Danger/Alarm 2	02/02/2001	
0000004902	012	001	Enter	Alert/Alarm 1	02/02/2001	
0000004901	012	001	Enter	Danger/Alarm 2	02/02/2001	
0000004900	012	001	Enter	Alert/Alarm 1	02/02/2001	
0000004899	012	002	Enter	Danger/Alarm 2	02/02/2001	

Number of Events in Recorder: 1000
Latest Sequence Number: 0000004918

Close Latest Events Page Up Page Down Print

Alarm Event List

Sequence Number	Event Info	Event Num	Class	Date dd/mm/yyyy	Event Time	Event Specific	Slot
0000008154	Config Token Acquired	00050	2	08/02/2001	08:17:07.10	CGHost	1
0000008153	Config Token Released	00051	2	06/02/2001	15:53:46.92	CGHost	1
0000008152	Config Token Acquired	00050	2	06/02/2001	15:52:57.33	CGHost	1
0000008151	Config Token Released	00051	2	06/02/2001	14:29:55.51	CGHost	1
0000008150	Device Configured	00300	2	06/02/2001	14:29:23.30		7
0000008149	Module Entered Cfg Mode	00302	2	06/02/2001	14:29:06.18		7
0000008148	Device Configured	00300	2	06/02/2001	14:28:41.19		7
0000008147	Module Entered Cfg Mode	00302	2	06/02/2001	14:28:20.25		7
0000008146	Config Token Acquired	00050	2	06/02/2001	14:28:03.93	CGHost	1
0000008145	Config Token Released	00051	2	06/02/2001	14:27:58.82	CGHost	1
0000008144	Config Token Acquired	00050	2	06/02/2001	14:23:21.07	CGHost	1
0000008143	Fail OK Limit Volt Check	00146	0	06/02/2001	12:57:32.85	Ch 1	12
0000008142	XDCR Signal Now Valid	00597	1	06/02/2001	12:57:31.79	Ch 1	12
0000008141	XDCR Fifty Percent Error	00592	1	06/02/2001	12:57:30.98	Ch 1	12
0000008140	XDCR Signal Now Valid	00597	1	06/02/2001	12:57:30.65	Ch 1	12
0000008139	XDCR Fifty Percent Error	00592	1	06/02/2001	12:57:27.14	Ch 1	12
0000008138	HW Rack Reset Inactive	00077	2	06/02/2001	08:51:35.45		1
0000008137	HW Rack Reset Active	00076	2	06/02/2001	08:51:35.07		1
0000008136	HW Rack Reset Inactive	00077	2	06/02/2001	08:51:32.50		1
0000008135	HW Rack Reset Active	00076	2	06/02/2001	08:51:32.37		1

Number of Events in Recorder: 500
Latest Sequence Number: 0000008154

Close Module Self-test... Latest Events Page Up Page Down Print Help

System Event List